PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference TJF/JY/39891	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/GB 03/02303	International filing date *(day/month/year)* 27.05.2003	Priority date *(day/month/year)* 31.05.2002
International Patent Classification (IPC) or both national classification and IPC B28D5/02		
Applicant WESTWIND AIR BEARINGS LTD		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 6 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the opinion
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
18.12.2003	02.09.2004
Name and mailing address of the international preliminary examining authority: European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer Rijks, M Telephone No. +31 70 340-3950

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB 03/02303

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:

Description, Pages

1-26 as originally filed

Claims, Numbers

1-23 received on 13.07.2004 with letter of 09.07.2004

Drawings, Sheets

1/4-4/4 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).

   ☐ the language of publication of the international application (under Rule 48.3(b)).

   ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   ☐ contained in the international application in written form.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority in written form.

   ☐ furnished subsequently to this Authority in computer readable form.

   ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

   ☐ the description, pages:

   ☐ the claims, Nos.:

   ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

   see separate sheet

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-23
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-23
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-23
	No:	Claims	

2. Citations and explanations

   see separate sheet

Re Item I
Basis of the report

The applicant has added the features "drive transfer means for transferring drive from one shaft to the other" from former claim 12 to amended claim 1.

From the description (in particular page 6, line 19 - page 7, line 1 and page 15, line 21 - page 16, line 10) it is clear that these features only relate to embodiments in which the first and second shafts rotate **in synchrony** with one another whereby **rotating** drive is transferred (page 16, line 6).

Also in the original set of claims the features "drive transfer means for transferring drive from one shaft to the other" from claim 12 are only disclosed in combination with the features "the first and second shafts rotate **in synchrony** with one another" from claim 11 (original claim 12 being dependent on original claim 11).

Consequently, newly filed claim 1 not only introduces subject-matter which extends beyond the content of the application as filed, contrary to Article 34(2)(b) PCT but is also too broad and not supported by the description as required by Article 6 PCT.

Furthermore, the features "to allow relative rotation between the two shafts" of newly filed, dependent claim 4 and claim 5 are in contradiction with the features that should be included in claim 1 i.e. that the first and second shafts rotate **in synchrony** with one another and that **rotating** drive is transferred between the two shafts.

Furthermore, the embodiment of the invention described on page 20, line 3 - page 22, line 10 and shown in figure 4 (see in particular page 20, lines 17-18, "no drive transfer means is required") does not fall within the scope of the claims. This inconsistency between the claims and the description leads to doubt concerning the matter for which protection is sought, thereby rendering the claims unclear, Article 6 PCT.

The remainder of this report has been based on the assumption that the following features are added to claim 1:

The first and second shafts rotate **in synchrony** with one another and **rotating** drive is transferred by the drive transfer means.

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1: US-B-6 176 7671 (HEIJKENSKJOELD MATS) 23 January 2001 (2001-01-23)
D2: US 2001/023973 A1 (AKRAM SALMAN ET AL) 27 September 2001 (2001-09-27)

Claims 1-20:

The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and shows (the references in parentheses applying to this document):

A machining spindle comprising an inner shaft (7) arranged for carrying a first tool (2) for machining a workpiece and an outer shaft (5) arranged for carrying a second tool (1) for machining the workpiece, the shafts (5,7) being mounted for rotation about a common axis and for axial movement relative to each other (see description column 1, line 64 - column 2, line 7), and the machining spindle further comprising a main body (8) within which the shafts (5,7) are journalled, the inner shaft (7) being mounted within the outer shaft (5) which in turn is journalled by means of an air bearing (see description column 1, lines 48-55) within the main body (8) and there being an air bearing provided to allow relative axial movement between the inner (7) and outer shafts (5), wherein the spindle further comprises drive transfer means for transferring rotating drive from one shaft to the other whereby the shafts (5,7) rotate in synchrony with one another (column 2, lines 18-29).

The subject-matter of claim 1 differs from this known machining spindle in that the spindle comprises sensor means for sensing when the tools carried by the two shafts contact with a conducting or semi-conducting workpiece, the sensor means being arranged to sense a current flowing around a path including the workpiece and the two shafts, the drive transfer means being insulated so that it does not offer an electrical conduction path between the two shafts.

The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

The problem to be solved by the present invention may be regarded as how to provide a simple arrangement with which it is possible to detect whether both of the tools are in contact with the workpiece.

The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

None of the prior art documents suggests to use insulated drive transfer means between two shafts running one inside the other in combination with sensor means for sensing a current flowing around a path including the workpiece and the two shafts.

Claims 2-20 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

Claims 21,22:

Claim 21 relates to the use of a machining spindle as claimed in any of the claims 1 to 18 or machining apparatus as claimed in claim 19 or 20 and as such also meets the requirements of the PCT with respect to novelty and inventive step.

Claims 22 is dependent on claim 21 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

Claim 23:

The document D2 is regarded as being the closest prior art to the subject-matter of claim 23, and shows (the references in parentheses applying to this document):

A method (paragraph 26, figures 3 and 5) of dicing semi-conductor wafers (52) using a machining apparatus (30) comprising a workpiece table (figure 1, reference 22) for supporting a wafer (52) and a machining spindle comprising a first shaft carrying a first cutting wheel (32) for machining the wafer (52), and a second shaft carrying a second cutting wheel (34) for machining the wafer (52), wherein the shafts are mounted for rotation about a common axis and for axial movement relative to each other, and the

method comprising the steps of: cutting along streets in one direction on the wafer (52), having a first street spacing (figure 5), using the two cutting wheels (32,34) set at a first wheel spacing; moving the shafts supporting the two cutting wheels (32,34) axially relative to one another to set the cutting wheels (32,34) at a second wheel spacing; and cutting along streets in another direction on the wafer (52), having a second street spacing, using the two cutting wheels set at the second wheel spacing (figure 5).

The subject-matter of claim 23 differs from this known method in that a different machining spindle is used: the first shaft of this machining spindle is an inner shaft and the second shaft is an outer shaft and the machining spindle comprises a main body within which the shafts are journalled, the inner shaft being mounted within the outer shaft which is in turn journalled by means of an air bearing within the main body.

The subject-matter of claim 23 is therefore new (Article 33(2) PCT).

The problem to be solved by the present invention may be regarded as how to cut semi-conductor wafers into chips of smaller dimensions.

The solution to this problem proposed in claim 23 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

None of the prior art documents suggests to use the simple and compact arrangement of two cutting wheels mounted on two shafts whereby one shaft runs inside the other for dicing semi-conductor wafers into chips of smaller dimensions.